SATS Airborne Enabling Technologies

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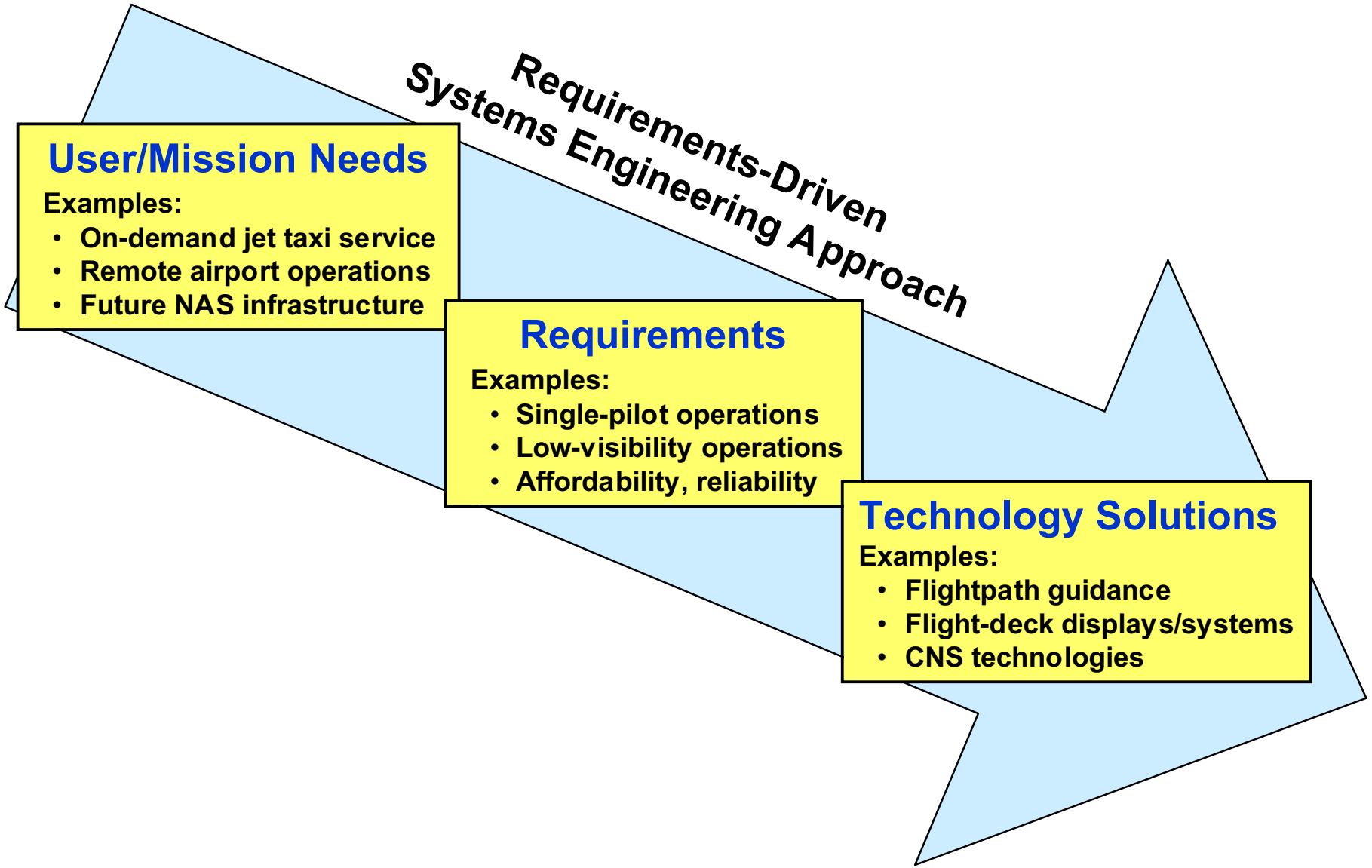
Breakout Groups

Group & topics	Facilitator
• **Airborne Enabling Technologies:**	**Ron Swanda, GAMA**
– **Flightpath Guidance**	
– **Flight Deck Systems**	
– **Communication/Navigation/Surveillance Systems**	
• Transportation System Analysis and Assessment	Ron Mauri, Volpe
– Economics	
– Market demand behavior	
– Technology performance metrics	
• Technology Integration and Flight Evaluation	Dres Zellweger, FAA
– Flight research aircraft and experiments	
– Simulation experiments and modeling	
– Airspace systems	
– Airspace procedures	

Airborne Enabling Technologies



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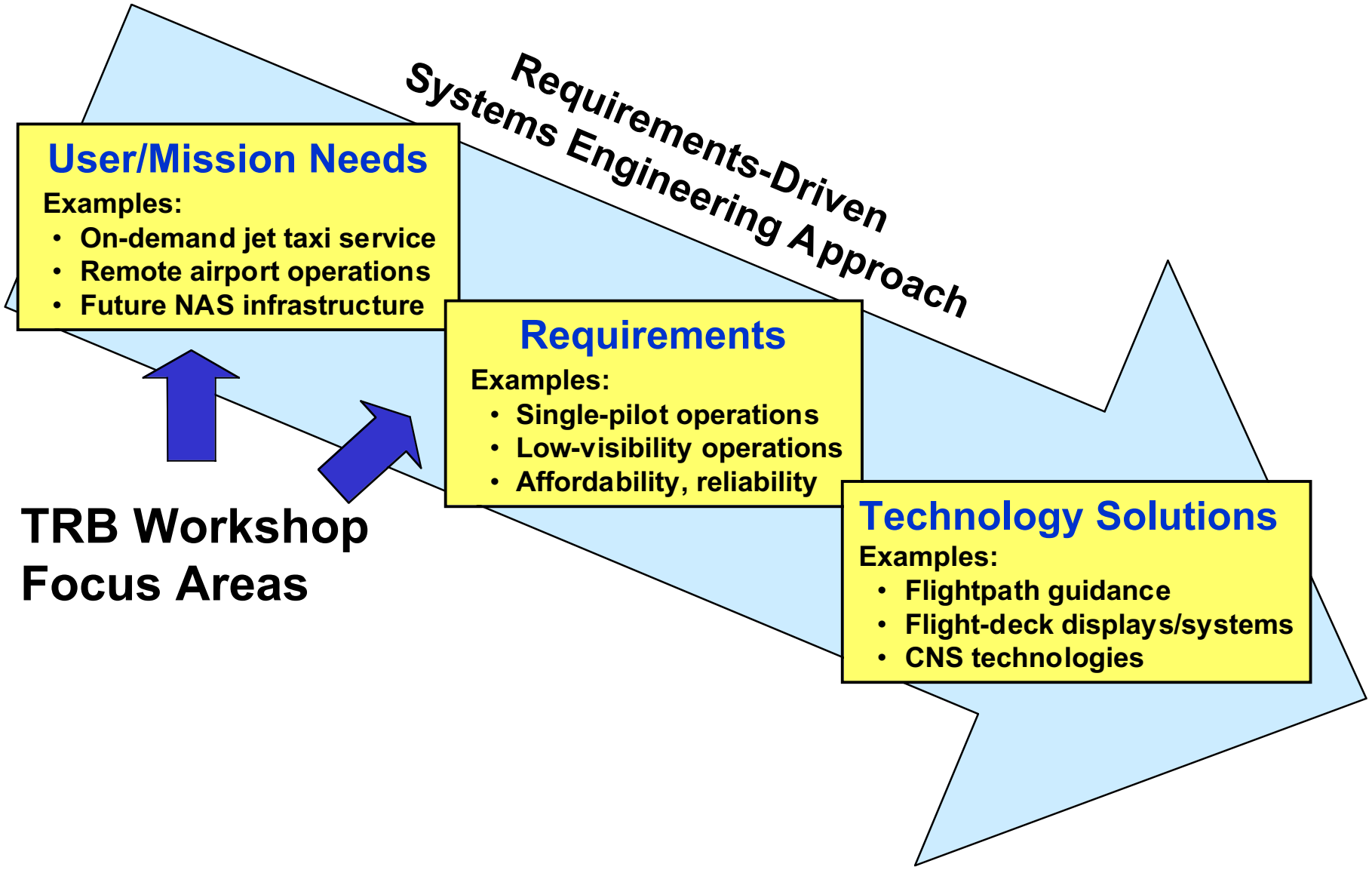


SATS Products Create Mobility

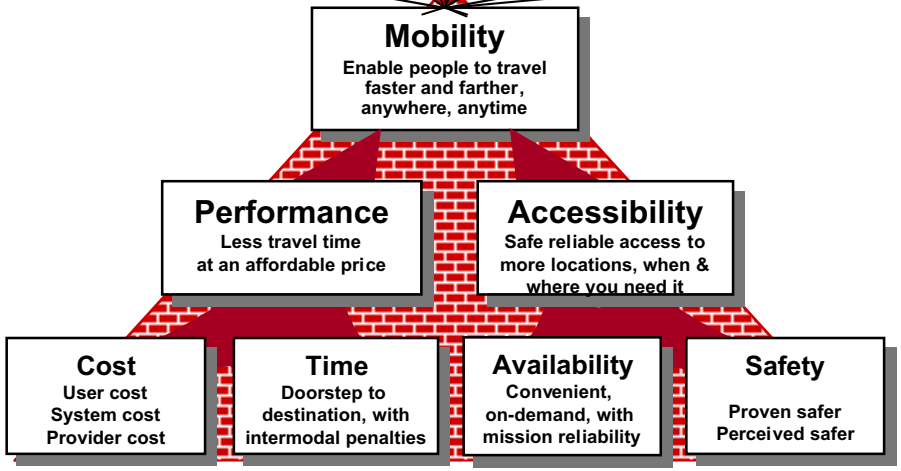
Premise: Affordable Access to More Local Airports = Increased Mobility

5 Year Goal

Demonstrate key airborne technologies for precise guided accessibility in small aircraft in near-all weather conditions to virtually any small airport in non-radar, non-towered airspace

Objectives

- **Higher-Volume Operations in Non-Radar Airspace at Non-Towered Facilities**
- **Lower Landing Minimums at Minimally-Equipped Landing Facilities**
- **Increase Single-Pilot Crew Safety & Mission Reliability**
- **Enroute Procedures & Systems for Integrated Fleet Operations**



SATS User/Mission Needs

- We cannot know with certainty who will be the future users of SATS technologies and procedures
- There will almost certainly be a variety of types of future users in differing proportions:
  - On-demand air taxi
  - Fractional ownership
  - Low-time private pilots
  - Corporate owned/operated jets
  - Regional jets
- Each type of user has different characteristics and cost drivers that lead to different appropriate technology solutions

- Therefore, for each of the four Operational Capabilities we will be exploring suites of technologies and procedures targeted to low-end as well as high-end users.

SATS Program Objective

Higher-Volume Operations at Non-Towered/Non-Radar Airports

Demonstrate simultaneous operations by multiple aircraft in non-radar airspace at and around small non-towered airports in near all-weather conditions

Metric

Number of vehicles operating in "terminal area"

Current	Technologies	Stretch Goal	Impact
"One-in-one-out rule" One Operation at a Time in Non-Radar Airspace	-Terminal Area Procedures -Sequencing and Separation -CNS Technologies	Up to 10 Vehicles Safely Operating in the "Terminal" Area Without Radar Coverage	Reliable Access to More Destinations through Efficient Use of Underutilized Airspace

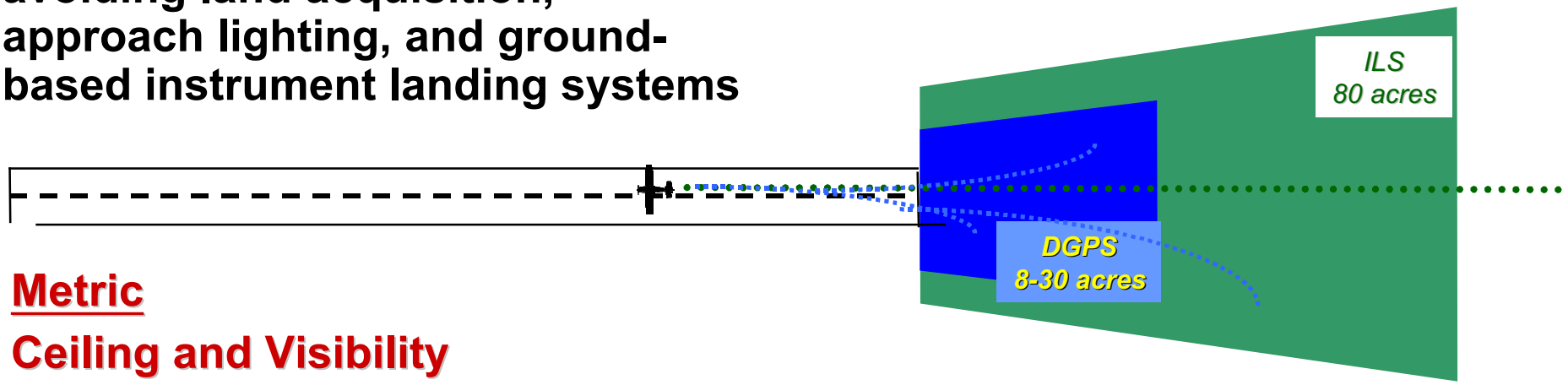
Figure 7

SATS Program Objective

Lower Landing Minimums at Minimally Equipped Landing Facilities

Demonstrate precision guidance, at any landing facility while avoiding land acquisition, approach lighting, and ground-based instrument landing systems

Runway Protection Zone (RPZ)



Metric

Ceiling and Visibility

Current	Technologies	Stretch Goal	Impact
Ceiling and Visibility Requirements as Restrictive as 1000 Ft and 3 Miles	- 4D Pathway Guidance - Energy Management - Flight Controls	Ceiling and Visibility Requirements as Low as 0 Ft and 1/4 Mile	More Landing Facilities Available More Often At Less Cost

SATS Program Objective

Increased Single-Pilot Crew Safety and Mission Reliability

Demonstrate single-pilot safety, precision, and mission reliability, better than a "professional pilot" using conventional instruments

Metric

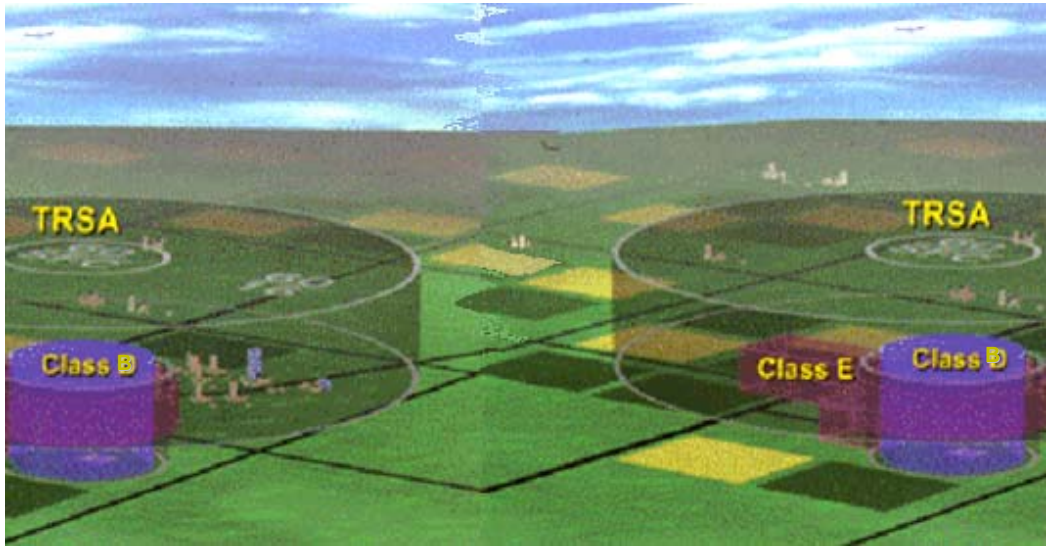
Total System Performance

Current	Technologies	Stretch Goal	Impact
Single Instrument Pilot Using Conventional or "Steam Gauge" Instrumentation	- Flight Controls/Systems Management - 4D Pathway Guidance - Displays of traffic, terrain, weather, etc.	Single-Pilot Safety Equal to 2 Airline Transport Pilots Using Conventional Instrumentation	Safer Small Aircraft Operations, combined with Greater Throughput in Underutilized Airspace

SATS Program Objective

En Route Procedures & Systems for Integrated Fleet Operations

Simulation and analytical assessment of concepts that integrate SATS equipped aircraft into the higher en route air traffic flows and controlled airspace



Metric

Mobility vs.
NAS Traffic Volumes

Current	Technologies	Stretch Goal	Impact
Structured Airspace with "Fixed" Procedures for all, and no provisions for onboard "air traffic intelligence	- Airspace Modeling/Sim - Automated Flightpath Management Systems - Interoperability with Evolving NAS	Analysis to Evaluate Impact of Concepts that Enable Mixed(SATS/non-SATS Equipped) Operations	Increased Mobility Without Sacrificing Capacity

Figure 10

Breakout Group Charter

- **The Airborne Enabling Technologies Breakout Group will focus predominantly on the following questions:**
  - **Is the single, hired-pilot, mixed-fleet (jets and props) early adopter model an appropriate initial target to guide SATS Program technology strategies, system assessment, and demonstration?**
  - **What else is required to prove SATS works?**